DETAILED ACTION

Claim Objections

1. Claim 5 is objected to because of the following informalities: Claim 5 recites the limitation instead of the data conversion portion, a data conversion …" The Applicant is claiming a different embodiment in claim 5. The claim should be an independent claim instead of being a dependent claim that embodies physical elements of another embodiment. The antecedent basis of the claim elements must be readdressed according to the embodiment of the new independent claim. Appropriate correction is required.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 1 recites the limitation "the subpixel" in lines 22 – 35. There is insufficient antecedent basis for this limitation in the claim.

It is unclear which subpixel "the subpixel" is referring to. For the purpose of art rejection, "the subpixel" will be construed as "one of the subpixels."

3. Claim 5 recites the limitation "the subpixel" in lines 14 – 31. There is insufficient antecedent basis for this limitation in the claim.

It is unclear which subpixel "the subpixel" is referring to. For the purpose of art rejection, “the subpixel” will be construed as “one of the subpixels.”

4. Claim 6 recites the limitation "the subpixel" in lines 9 – 17. There is insufficient antecedent basis for this limitation in the claim.

It is unclear which subpixel "the subpixel" is referring to. For the purpose of art rejection, “the subpixel” will be construed as “one of the subpixels.”

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. **Claims 1 – 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanou et la. (Hereinafter "Kanou" US 6,088,062) in view of Brown Elliott et al. (Hereinafter "Elliott" US 2003/0034992 A1).**

Regarding claim 1, as best understood by Examiner, Kanou teaches an image display device that includes a display screen where pixels emitting colored light are arranged cyclically so as to repeat every predetermined display pixel pitch at least in a predetermined cyclic arrangement direction and displays images on the display screen (See Fig. 1 for the pixel arrangement. Col. 2, lines 55 – 65; "with high definition television or conversion of the number of pixels..." Col. 58, lines 59 – 67; "pixel data of R, G, or B pixel data…"), the device comprising:

a data conversion portion for converting image data having input pixel data each of which is associated with each data point when the data points are arranged at a data

pixel pitch smaller than the display pixel pitch in the cyclic arrangement direction to converted image data having converted pixel data each of which is associated with each pixel data corresponding to each of the pixels (Col. 6, lines 50 – 55; “In the enlarging conversion of the number of pixels by 2:3, three output pixels are created per two input pixels, as shown in Fig. 1 ... In the following explanation, the cubic interpolation of interpolation from a range of four points as the near-by range is taken as an example.” Fig. 1 shows the pixel phase information of the input and output pixel. The wider input pixel phase means smaller pixel pitch due to the lower resolution compared to the output pixel. See Fig. 1. R_i are data points.); and

and a display control portion for controlling the colored light of each of the pixels arranged in the display screen based on each of the pixel data that was converted by the data conversion portion, and thereby to display images on the display screen (A display control portion is inherently required to control the colored light of each pixel to display images on a display screen such as a high definition television described above).

the data conversion portion performs, for each of the pixels, an operation for generating pixel data corresponding to one of the pixels by adding weight depending on a distance between the center of the one of the pixels and each of the data points to plural color data corresponding to the colored light of the one of the pixels and combining the plural color data together (Col. 7, lines 1 – 34; “The coefficients Cu(x) of the equation (2) are values calculated from the above-mentioned cubic interpolation functions, and are calculated from the phase specifying how much the output pixel to be found is deviated from the input pixel.” See Fig. 1 for the distance between the center

of the output pixel and the plural input pixels. The equation show in Col. 7, lines 1 - 20 show the relationship between the distance and the weight and how they are combined togehter.),

the plural color data, in a state, constituting plural pixel data associated with the data points that are present within a predetermined area extending from the center of the one of the pixels to both sides in the cyclic arrangement direction, the state being a state where the data points are arranged in the display screen in a manner to overlap with the one of the pixels at positions where the respective data points are off the respective centers of the one of the pixels in the cyclic arrangement direction (See Fig. 1 for the cyclic arrangement direction in both sides of the center of the one of the pixels/output pixel. The plural color data/ input pixels overlap with one of the pixels/output pixel.).

But Kanou does not expressly describe a specific subpixel arrangement.

However, in a similar field of endeavor, Brown teaches a various subpixel arrangement wherein a source pixel data of a first format is converted for a display of a second format having a plurality of three-color pixel elements (Para 0017).

Therefore, taking the combined teachings of Kanou and Brown, as a whole, it would have been obvious to a person having ordinary skill in the art to incorporate the idea of having a subpixel arrangement for format conversion as taught by Brown into the image display device as taught by Kanou to obtain an image display device that includes a display screen where subpixels emitting colored light of each color are

arranged cyclically to take most any stored image and render it onto any practicable color subpixel arrangement.

Regarding claim 2, Kanou and Brown teach the image display device according to claim 1, wherein the predetermined area is an area extending from the center of the subpixel to both sides in the cyclic arrangement direction by an amount corresponding to one display pixel pitch respectively (Kanou: See Fig. 1 for the pixel pitch. The phase information corresponds to the pixel pitch and resolution relationship between the input and output pixels.) .

Regarding claim 3, Kanou and Brown teach the image display device according to claim 1, wherein, with respect to the cyclic arrangement direction, the data pixel pitch is represented by an equation: Pd=[(n-i)/n]Po where Po denotes the display pixel pitch, n denotes the number of subpixels within one display pixel pitch, Pd denotes the data pixel pitch and i is an integer ($1 \leq i< n$) [Kanou: See Fig. 1. Col. 6, lines 50 – 55; “In the enlarging conversion of the number of pixels by 2:3, three output pixels are created per two input pixels, as shown in Fig. 1 ... In the following explanation, the cubic interpolation of interpolation from a range of four points as the near-by range is taken as an example.” Fig. 1 shows the pixel phase information of the input and output pixel. The wider input pixel phase means smaller pixel pitch due to the lower resolution compared to the output pixel. The 2:3 relationship between the input and output pixels satisfies the above equation in the even the integer is equal to 1.].

Regarding claim 4, Kanou and Brown teach the image display device according to claim 3, wherein when the number of subpixels n is three and the integer i is one, the data pixel pitch Pd is expressed as an equation: Pd=(2/3)Po (Kanou: See Fig. 1. Col. 6, lines 50 – 55; “In the enlarging conversion of the number of pixels by 2:3, three output pixels are created per two input pixels, as shown in Fig. 1 ... In the following explanation, the cubic interpolation of interpolation from a range of four points as the near-by range is taken as an example.” Fig. 1 shows the pixel phase information of the input and output pixel. The wider input pixel phase means smaller pixel pitch due to the lower resolution compared to the output pixel. The 2:3 relationship between the input and output pixels satisfies the above equation in the even the integer is equal to 1.).

Regarding claim 5, as best understood by Examiner, Kanou teaches the image display device according to claim 1, further comprising, instead of the data conversion portion, a data conversion portion for converting image data having pixel data each of which is associated with each data point when the data points are arranged at a data pixel pitch smaller than the display pixel pitch in the cyclic arrangement direction to each pixel data corresponding to each of the pixels (Col. 6, lines 50 – 55; “In the enlarging conversion of the number of pixels by 2:3, three output pixels are created per two input pixels, as shown in Fig. 1 ... In the following explanation, the cubic interpolation of interpolation from a range of four points as the near-by range is taken as an example.” Fig. 1 shows the pixel phase information of the input and output pixel. The wider input

pixel phase means smaller pixel pitch due to the lower resolution compared to the output pixel. See Fig. 1. R_i are data points.), wherein, the data conversion portion performs a first operation for each imaginary pixel corresponding to each of the pixels and a second operation for each of the pixels, the first operation being an operation for generating imaginary pixel data corresponding to one imaginary pixel corresponding to one the pixels by adding weight depending on the distance between the center of the one of the pixels and each of the data points to the plural pixel data associated with the data points that are present within the predetermined area extending from the center of the pixel to both sides in the cyclic arrangement direction (Col. 7, lines 1 – 34; “The coefficients Cu(x) of the equation (2) are values calculated from the above-mentioned cubic interpolation functions, and are calculated from the phase specifying how much the output pixel to be found is deviated from the input pixel.” See Fig. 1 for the distance between the center of the output pixel and the plural input pixels. The equation show in Col. 7, lines 1 - 20 show the relationship between the distance and the weight and how they are combined together. The calculated data is imaginary since the pixel data is calculated to an unknown value from known values by using interpolated/imaginary values.), and combining the plural pixel data together in the state where the data points are arranged in the display screen in a manner to overlap with the one of the pixels at the positions where the respective data points are off the respective centers of the pixels in the cyclic arrangement direction (See Fig. 1 for the cyclic arrangement direction in both sides of the center of the one of the pixels/output pixel. The plural pixel data/ input pixels overlap with one of the pixels/output pixel.), the second operation

being an operation for generating pixel data corresponding to the one of the pixels by combining the plural color data corresponding to the colored light of the pixel, and the plural color data constituting the plural imaginary pixel data that correspond to the imaginary pixel corresponding to the one of the pixel and imaginary pixels arranged around the imaginary pixel (Col. 14, lines 13 – 22; “since the two chroma signals are of the same format as the luminance signal, these two chroma signals can be processed in the same manner as the above-mentioned luminance signals.").

But Kanou does not expressly describe a specific subpixel arrangement.

However, in a similar field of endeavor, Brown teaches a various subpixel arrangement wherein a source pixel data of a first format is converted for a display of a second format having a plurality of three-color pixel elements (Para 0017).

Therefore, taking the combined teachings of Kanou and Brown, as a whole, it would have been obvious to a person having ordinary skill in the art to incorporate the idea of having a subpixel arrangement for format conversion as taught by Brown into the image display device as taught by Kanou to obtain an image display device that includes a display screen where subpixels emitting colored light of each color are arranged cyclically to take most any stored image and render it onto any practicable color subpixel arrangement.

Regarding claim 6, Kanou teaches an image display method for an image display device that includes a display screen where pixels emitting colored light of each color are arranged cyclically so as to repeat every predetermined display pixel pitch at least in

a predetermined cyclic arrangement direction and displays images on the display screen (See Fig. 1 for the pixel arrangement. Col. 2, lines 55 – 65; “with high definition television or conversion of the number of pixels..." Col. 58, lines 59 – 67; “pixel data of R, G, or B pixel data…”), the method comprising:

performing, for each of the pixels, an operation for generating pixel data corresponding to one of the pixels by adding weight depending on a distance between the center of the one of the pixels and each of the data points to plural color data corresponding to the colored light of the one of the pixel and combining the plural color data together (Col. 7, lines 1 – 34; “The coefficients Cu(x) of the equation (2) are values calculated from the above-mentioned cubic interpolation functions, and are calculated from the phase specifying how much the output pixel to be found is deviated from the input pixel.” See Fig. 1 for the distance between the center of the output pixel and the plural input pixels. The equation show in Col. 7, lines 1 - 20 show the relationship between the distance and the weight and how they are combined togehter.),

the plural color data, in a state, constituting plural pixel data associated with the data points that are present within a predetermined area extending from the center of the one of the pixel to both sides in the cyclic arrangement direction, the state being a state where data points are aligned at a data pixel pitch smaller than the display pixel pitch in the cyclic arrangement direction and are arranged in the display screen in a manner to overlap with the pixels at positions where the respective data points are off the respective centers of the pixels in the cyclic arrangement direction (See Fig. 1 for the cyclic arrangement direction in both sides of the center of the one of the

pixels/output pixel. The plural color data/ input pixels overlap with one of the pixels/output pixel.); controlling the colored light of each of the pixels arranged in the display screen based on each of the pixel data generated by the operation; and displaying images on the display screen (A display control portion is inherently required to control the colored light of each pixel to display images on a display screen such as a high definition television described above).

But Kanou does not expressly describe a specific subpixel arrangement.

However, in a similar field of endeavor, Brown teaches a various subpixel arrangement wherein a source pixel data of a first format is converted for a display of a second format having a plurality of three-color pixel elements (Para 0017).

Therefore, taking the combined teachings of Kanou and Brown, as a whole, it would have been obvious to a person having ordinary skill in the art to incorporate the idea of having a subpixel arrangement for format conversion as taught by Brown into the image display method for an image display device as taught by Kanou to obtain an image display method for an image display device that includes a display screen where subpixels emitting colored light of each color are arranged cyclically to take most any stored image and render it onto any practicable color subpixel arrangement.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YONG H. SIM whose telephone number is (571)270-

1189. The examiner can normally be reached on Monday - Friday (Alternate Fridays off) 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amr Awad can be reached on (571) 272-7764. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/YONG H SIM/
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